

Application No. 10/786,547  
Amendment dated December 28, 2005  
Reply to Office Action of September 30, 2005

Docket No.: 21994-00067-US

### AMENDMENTS TO THE CLAIMS

1. (Currently amended) A magnetron sputtering apparatus comprising:
  - a vacuum chamber;
  - a target;
  - a cathode holding the target in the vacuum chamber;
  - a substrate;
  - an anode holding the substrate and being allegated located above the cathode so as to face the substrate toward the target on the cathode;
  - a permanent magnet assembly generating a magnetic field and being allegated located under the cathode; and
  - a rotation controller rotating the permanent magnet assembly around an axis so as to pivot with rotation occurring on almost a center of the target as the axis,
  - the permanent magnet assembly further comprising:
    - a base;
    - a first permanent magnet being fixed on the base in the middle; and
    - a second permanent magnet in a ring shape being fixed in a peripheral area of the base so as to surround the first permanent magnet,
  - wherein a magnetic polarity of the second permanent magnet is inverse with respect to a magnetic polarity of the first permanent magnet, and
  - wherein magnetic field strength of the second permanent magnet is weaker than magnetic field strength of the first permanent magnet, and
  - wherein the permanent magnet assembly is formed such that a plane constituted by a top surface of the first permanent magnet and another top surface of the second permanent magnet is slanted with respect to a surface of the target in a cylindrical shape of which top portion is cut diagonally,

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—~~the magnetron sputtering apparatus is characterized in that the permanent magnet is perpendicularly allocated on a top of the axis of rotation of the rotation controller.~~

2. (Currently amended) The magnetron sputtering apparatus in accordance with claim 1, wherein the first permanent magnet is fixed on a middle of the base in the middle with shifting ~~wherein~~ a center axis of the first permanent magnet is shifted eccentrically with respect to ~~a~~ the center of rotation of the permanent magnet assembly, and  
—~~wherein the permanent magnet is either in a cylindrical shape of which top portion is cut diagonally or in a shape having different heights of which height steps down gradually from one end to the other.~~

3. (Currently amended) ~~The A~~ magnetron sputtering apparatus in accordance with claim 1, comprising:  
a vacuum chamber;  
a target;  
a cathode holding the target in the vacuum chamber;  
a substrate;  
an anode holding the substrate and being located above the cathode so as to face the substrate toward the target on the cathode;  
a permanent magnet assembly generating magnetic field and being located under the cathode; and  
a rotation controller rotating the permanent magnet assembly around an axis with rotation occurring on a center of the target as the axis,  
the permanent magnet assembly further comprising:  
a base;

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a first permanent magnet being fixed on a middle of the base in the middle with shifting wherein a center axis of the first permanent magnet is shifted eccentrically with respect to a-the center of rotation of the permanent magnet assembly; and

a second permanent magnet in a ring shape being fixed in a peripheral area of the base so as to surround the first permanent magnet~~[,]~~; and

wherein a magnetic polarity of the second permanent magnet is inverse with respect to a magnetic polarity of the first permanent magnet~~[,]~~; and

wherein magnetic field strength of the second permanent magnet is weaker than magnetic field strength of the first permanent magnet, and

~~— wherein top surfaces of the first and second permanent magnets are made to be flat horizontally and in parallel with the base respectively.~~

4. (Currently amended) The magnetron sputtering apparatus in accordance with claim 1, further comprising:

~~— a wedge shaped member having a predetermined slant angle being located between the rotation controller and the permanent magnet assembly; and~~

~~— wherein a top surface of the member contacting a bottom surface of the base is slanted with respect to the target~~

~~— wherein the permanent magnet is shaped into that top surfaces of the first and second permanent magnets are made to be flat horizontally and in parallel with the base respectively;~~

~~— the magnetron sputtering apparatus is characterized in that the permanent magnet is allocated on a top of the axis of rotation of the rotation controller on a slant with respect to the axis of rotation of the rotation controller.~~

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5. (Currently amended) The magnetron sputtering apparatus in accordance with claim 1, further comprising:

a wedge shaped member having a predetermined slant angle being located between the rotation controller and the permanent magnet assembly; and

wherein a top surface of the member contacting a bottom surface of the base is slanted with respect to the target

~~wherein the first permanent magnet is fixed on the base in the middle with shifting a center axis of the first permanent magnet eccentrically with respect to a center of rotation of the permanent magnet; and~~

~~wherein the permanent magnet is shaped into that top surfaces of the first and second permanent magnets are made to be flat horizontally and in parallel with the base respectively,~~

~~—the magnetron sputtering apparatus is characterized in that the permanent magnet is allocated on a top of the axis of rotation of the rotation controller on a slant with respect to the axis of rotation of the rotation controller.~~

6. (Currently amended) A magnetron sputtering apparatus comprising:

a vacuum chamber;

a target;

a cathode holding the target in the vacuum chamber;

a substrate;

an anode holding the substrate and being ~~allocated~~located above the cathode so as to face the substrate toward the target on the cathode; and

a permanent magnet assembly generating magnetic field and being ~~allocated~~located under the cathode[[.]];

the permanent magnet assembly further comprising:

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a first permanent magnet provided with a sliding mechanism for sliding the first permanent magnet horizontally with respect to the target, being ~~alleged~~ located in the middle of the target base; and

a second permanent magnet being fixed in a peripheral area of the target base; [ , ]  
wherein a magnetic polarity the N-pole of the second first permanent magnet is inverse with respect to a magnetic polarity faces toward the target and the S-pole of the first second permanent magnet faces toward the target; [ , ] and

wherein magnetic field strength of the second permanent magnet is weaker than magnetic field strength of the first permanent magnet, and  
~~— wherein a top surface of the second permanent magnet is in parallel with a top surface of the first permanent magnet.~~